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Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1.  (currently amended) A signal processing apparatus comprising:

an input to receive a signal;

a buffer responsive to the input to store the signal;

a detector responsive to the input to interpret the signal as discrete values;

an averaging circuit responsive to the buffer and the detector to cause interpretation, by

the detector during a retry mode, of a new signal comprising an average of a previous signal

stored in the buffer and a current signal; ~~and~~

a control circuit that determines whether the discrete values are adequately indicated

based on output of the detector, that initiates the retry mode when the discrete values are not

adequately indicated, and that determines whether the discrete values are adequately indicated

from the interpretation of the new signal in the retry mode**; and**

**an error correction circuit responsive to the detector and the averaging circuit to**

**provide a signal quality metric that governs which signals are averaged**.


2.  (previously presented) The apparatus of claim 1, wherein the signal from the input

comprises a read signal received from a storage medium.

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3. (previously presented) The apparatus of claim 1, wherein the signal from the input comprises an analog signal, the apparatus further comprising a filter and an analog-to-digital converter (ADC) coupled between the input and the detector.

4. (original) The apparatus of claim 3, wherein the buffer is coupled between the ADC and the filter.

5. (original) The apparatus of claim 3, wherein the buffer is coupled between the filter and the detector.

6. (original) The apparatus of claim 3, wherein the filter comprises a finite impulse response (FIR) digital filter coupled between the ADC and the detector.

7. (cancelled)

8. (original) The apparatus of claim 1, wherein the detector comprises a Viterbi detector.

9. (currently amended) A ~~The~~ **signal processing** apparatus ~~of claim 1~~, **comprising:**

**an input to receive a signal;**

**a buffer responsive to the input to store the signal;**

**a detector responsive to the input to interpret the signal as discrete values;**

**an averaging circuit responsive to the buffer and the detector to cause**

**interpretation, by the detector during a retry mode, of a new signal comprising an average**

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**of a previous signal stored in the buffer and a current signal; and**

**a control circuit that determines whether the discrete values are adequately**

**indicated based on output of the detector, that initiates the retry mode when the discrete**

**values are not adequately indicated, and that determines whether the discrete values are**

**adequately indicated from the interpretation of the new signal in the retry mode;**

wherein the control circuit determines whether the discrete values are adequately

indicated based on comparison of interpretations of the new averaged signal and the current

signal.


10.     (currently amended) The apparatus of claim **9** [[1]], wherein the control circuit

causes averaging of a defined number of most recent input signals, wherein the defined number

is greater than two.


11.     (previously presented) The apparatus of claim 1, wherein the control circuit

causes the previous signal stored in the buffer to be an averaged input signal when two or more

signals are obtained in the retry mode.


12.     (currently amended) A storage device, comprising:

a storage medium;

a head assembly operable to generate a read signal from the storage medium;

a buffer that saves the read signal generated by the head assembly;

a detector that interprets the read signal as discrete values;

an averaging circuit responsive to the buffer and the detector; ~~and~~

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a control circuit responsive to the averaging circuit to determine whether the discrete

values are adequately indicated based on output of the detector, initiate a retry mode when the

discrete values are not adequately indicated, cause interpretation by the detector in the retry

mode of a new read signal comprising an average of a previous read signal stored in the buffer

and a current read signal, and determine whether the discrete values are adequately indicated

from the interpretation of the new signal in the retry mode; **and**

**an error correction circuit responsive to the detector and the averaging circuit to**

**provide a signal quality metric that governs which read signals are averaged**.


13.      (original) The storage device of claim 12, wherein the read signal comprises an

analog read signal, the storage device further comprising a filter and an analog-to-digital

converter (ADC) coupled between the head assembly and the detector.


14.      (original) The storage device of claim 13, wherein the buffer is coupled between

the ADC and the filter.


15.      (original) The storage device of claim 13, wherein the buffer is coupled between

the filter and the detector.


16.      (original) The storage device of claim 13, wherein the filter comprises a finite

impulse response (FIR) digital filter coupled between the ADC and the detector.


17.      (cancelled)

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18.     (currently amended) The storage device of claim **12** [[17]], wherein the detector comprises a Viterbi detector.

19.     (currently amended) **A** ~~The~~ storage device ~~of claim 12~~, **comprising:**

**a storage medium;**

**a head assembly operable to generate a read signal from the storage medium;**

**a buffer that saves the read signal generated by the head assembly;**

**a detector that interprets the read signal as discrete values;**

**an averaging circuit responsive to the buffer and the detector; and**

**a control circuit responsive to the averaging circuit to determine whether the discrete values are adequately indicated based on output of the detector, initiate a retry mode when the discrete values are not adequately indicated, cause interpretation by the detector in the retry mode of a new read signal comprising an average of a previous read signal stored in the buffer and a current read signal, and determine whether the discrete values are adequately indicated from the interpretation of the new signal in the retry mode;**

wherein the control circuit determines whether the discrete values are adequately indicated based on comparison of interpretations of the new averaged read signal and the current read signal.

20.     (currently amended) The storage device of claim **19** [[12]], wherein the control circuit causes averaging of a defined number of most recent read signals, wherein the defined number is greater than two.

21.     (original) The storage device of claim 12, wherein the control circuit causes the

previous read signal stored in the buffer to be an averaged read signal when two or more read

attempts are made in the retry mode.


22.     (currently amended) A method of reading data on a channel or media, the method

comprising:

interpreting an input signal as discrete values;

deciding whether the discrete values have been adequately interpreted from the input

signal;

entering a retry mode in response to a decision that the discrete values have not been

adequately interpreted from the input signal; and

averaging, in the retry mode, multiple signals to improve interpretation of the input signal

including:

obtaining a second signal representing same data as the input signal,

averaging the input signal and the second signal to produce an averaged signal and to

improve signal interpretation,

interpreting the averaged signal, and

determining whether the discrete values are adequately indicated based on the averaged

signal;

**wherein interpreting the input signal comprises using maximum likelihood detection**

**and error correction to provide the discrete values and a signal quality metric, the method**

**further comprising excluding the input signal from the multiple signals to be averaged**

**based on the signal quality metric.**

23.     (original) The method of claim 22, wherein interpreting the input signal

comprises:

sampling the input signal;

storing the sampled input signal; and

detecting the discrete values in the sampled input signal.

24.     (original) The method of claim 23, wherein sampling the input signal comprises

converting the input signal to a digital signal, storing the sampled input signal comprises storing

the digital signal, and the multiple signals to be averaged include the stored digital signal.

25.     (original) The method of claim 23, wherein sampling the input signal comprises

converting the input signal to a digital signal and filtering the digital signal based on finite

impulse response, storing the sampled input signal comprises storing the filtered digital signal,

and the multiple signals to be averaged include the stored and filtered digital signal.

26.     (original) The method of claim 22, wherein the input signal comprises a read

signal received from a storage medium, interpreting the input signal comprises determining if the

read signal adequately indicates the discrete values, and averaging the multiple signals comprises

averaging multiple read signals of the storage medium to improve read signal interpretation.

27.     (cancelled)

28.    (cancelled)


29.    (previously presented) The method of claim 22, wherein determining whether the

discrete values are adequately indicated comprises interpreting the averaged signal with a Viterbi

detector.


30.    (currently amended) A ~~The~~ method of **reading data on a channel or media**

~~claim 22~~, **the method comprising:**

    **interpreting an input signal as discrete values;**

    **deciding whether the discrete values have been adequately interpreted from the**

**input signal;**

    **entering a retry mode in response to a decision that the discrete values have not**

**been adequately interpreted from the input signal; and**

    **averaging, in the retry mode, multiple signals to improve interpretation of the input**

**signal including:**

    **obtaining a second signal representing same data as the input signal,**

    **averaging the input signal and the second signal to produce an averaged signal and**

**to improve signal interpretation,**

    **interpreting the averaged signal, and**

    **determining whether the discrete values are adequately indicated based on the**

**averaged signal;**

    wherein determining whether the discrete values are adequately indicated comprises

comparing interpretations of the averaged signal and of the second signal.

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31.    (currently amended) The method of claim **30** 22, wherein averaging the multiple signals further comprises, in the retry mode, in response to the discrete values being inadequately indicated, repeatedly obtaining a new signal, averaging most recent signals to generate a newly averaged signal, and determining if the newly averaged signal adequately indicates the discrete values.

32.    (original) The method of claim 31, wherein averaging the most recent signals comprises averaging the three most recent signals.

33.    (previously presented) The method of claim 22, wherein averaging the multiple signals further comprises, in the retry mode, in response to the discrete values being inadequately indicated, repeatedly obtaining a new signal, averaging the new signal with the previous averaged signal, and determining if the newly averaged signal adequately indicates the discrete values.

34.    (currently amended) A system comprising:

means for storing data; and

means for reading the data, said means for reading including:

means for interpreting an input signal as discrete values;

means for deciding whether the discrete values have been adequately interpreted from the input signal;

means for entering a retry mode in response to a decision that the discrete values have not been adequately interpreted from the input signal; and

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means for averaging, in the retry mode, multiple read signals to improve data reading including:

means for obtaining a second signal representing same data as the input signal,

means for averaging the input signal and the second signal to produce an averaged signal and to improve signal interpretation,

means for interpreting the averaged signal, and

means for determining whether the discrete values are adequately indicated based on the averaged signal;

**wherein the means for reading further includes error-detection means for controlling which read signals are averaged**.

35. (original) The system of claim 34, wherein the means for storing data comprises magnetic means for storing data.

36. (original) The system of claim 34, wherein the means for averaging comprises means for saving a digital read signal before equalization in a read channel.

37. (original) The system of claim 36, wherein the means for saving a digital read signal comprises means for saving an averaged read signal.

38. (original) The system of claim 34, wherein the means for reading further includes means for converting the read signals to digital signals, means for filtering the digital signals, and means for detecting stored information in the filtered digital signals.

39.     (original) The system of claim 38, wherein the means for averaging comprises

means for storing a read signal between the means for converting and the means for filtering.

40.     (original) The system of claim 38, wherein the means for averaging comprises

means for storing a read signal between the means for filtering and the means for detecting.

41.     (original) The system of claim 38, wherein the means for detecting comprises

Viterbi means for detecting stored information in the filtered digital signals.

42.     (cancelled)

43.     (currently amended) **A** ~~The~~ system ~~of claim 34,~~ **comprising:**

**means for storing data; and**

**means for reading the data, said means for reading including:**

**means for interpreting an input signal as discrete values;**

**means for deciding whether the discrete values have been adequately interpreted**

**from the input signal;**

**means for entering a retry mode in response to a decision that the discrete values**

**have not been adequately interpreted from the input signal; and**

**means for averaging, in the retry mode, multiple read signals to improve data**

**reading including:**

**means for obtaining a second signal representing same data as the input signal,**

**means for averaging the input signal and the second signal to produce an averaged**

**signal and to improve signal interpretation,**

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**means for interpreting the averaged signal, and**

**means for determining whether the discrete values are adequately indicated based**

**on the averaged signal;**

wherein the means for reading further includes means for comparing an averaged read

signal and a current read signal.


44.     (currently amended) The system of claim **43** [[34]], wherein the means for

averaging comprises means for averaging three or more most recent read signals.


45.     (currently amended) An article comprising:

means for interpreting an input signal as discrete values;

means for deciding whether the discrete values have been adequately interpreted from the

input signal;

means for entering a retry mode in response to a decision that the discrete values have not

been adequately interpreted from the input signal; and

means for averaging, in the retry mode, multiple signals to improve interpretation of the

input signal including:

means for obtaining a second signal representing same data as the input signal,

means for averaging the input signal and the second signal to produce an averaged signal

and to improve signal interpretation,

means for interpreting the averaged signal, and

means for determining whether the discrete values are adequately indicated based on the

averaged signal;

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**wherein the means for interpreting comprises maximum likelihood detection and error correction means for providing the discrete values and a signal quality metric used to exclude an input signal from averaging.**

46. (original) The article of claim 45, wherein the means for interpreting comprises:

means for sampling the input signal;

means for storing the sampled input signal; and

means for detecting the discrete values in the sampled input signal.

47. (original) The article of claim 46, wherein the means for sampling comprises means for converting the input signal to a digital signal, and the means for storing comprises means for storing the digital signal, and the means for averaging comprises means for averaging the stored digital signal and a current signal.

48. (original) The article of claim 46, wherein the means for sampling comprises means for converting the input signal to a digital signal and means for filtering the digital signal based on finite impulse response, and the means for storing comprises means for storing the filtered digital signal, and the means for averaging comprises means for averaging the stored and filtered digital signal and a current signal.

49. (cancelled)

50. (cancelled)

51. (previously presented) The article of claim 45, wherein the means for determining

comprises Viterbi means for interpreting the averaged signal.

52. (currently amended) **An** ~~The~~ article ~~of claim 45,~~ **comprising:**

**means for interpreting an input signal as discrete values;**

**means for deciding whether the discrete values have been adequately interpreted**

**from the input signal;**

**means for entering a retry mode in response to a decision that the discrete values**

**have not been adequately interpreted from the input signal; and**

**means for averaging, in the retry mode, multiple signals to improve interpretation of**

**the input signal including:**

**means for obtaining a second signal representing same data as the input signal,**

**means for averaging the input signal and the second signal to produce an averaged**

**signal and to improve signal interpretation,**

**means for interpreting the averaged signal, and**

**means for determining whether the discrete values are adequately indicated based**

**on the averaged signal;**

wherein the means for determining comprises means for comparing interpretations of the

averaged signal and of the second signal.

53. (currently amended) An apparatus comprising:

means for receiving a signal;

means for storing the signal;

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means for interpreting the signal as discrete values;

retry-mode means for interpreting a new signal comprising an average of a stored signal

and a current signal; ~~and~~

means for determining whether the discrete values are adequately indicated based on

output of the means for interpreting, initiating the retry-mode means when the discrete values are

not adequately indicated, and determining whether the discrete values are adequately indicated

from the interpretation of the new signal by the retry-mode means**; and**

**means for providing a signal quality metric that governs which signals are averaged**.


54. (original) The apparatus of claim 53, wherein the means for receiving comprises

means for receiving a read signal from a storage medium.


55. (original) The apparatus of claim 53, further comprising means for converting a

received analog signal to a digital signal and means for filtering the digital signal.


56. (original) The apparatus of claim 55, wherein the means for storing comprises

means for buffering the digital signal.


57. (original) The apparatus of claim 55, wherein the means for storing comprises

means for buffering the filtered digital signal.


58. (original) The apparatus of claim 55, wherein the means for filtering comprises a

finite impulse response (FIR) digital filter.

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59. (cancelled)

60. (original) The apparatus of claim 53, wherein the retry-mode means for interpreting comprises a Viterbi detector.

61. (currently amended) **An** ~~The~~ apparatus ~~of claim 53,~~ **comprising:**

**means for receiving a signal;**

**means for storing the signal;**

**means for interpreting the signal as discrete values;**

**retry-mode means for interpreting a new signal comprising an average of a stored signal and a current signal; and**

**means for determining whether the discrete values are adequately indicated based on output of the means for interpreting, initiating the retry-mode means when the discrete values are not adequately indicated, and determining whether the discrete values are adequately indicated from the interpretation of the new signal by the retry-mode means;**

wherein the means for determining comprises means for determining whether the discrete values are adequately indicated based on comparison of interpretations of the averaged signal and the current signal.

62. (currently amended) The apparatus of claim **61** [[53]], further comprising means for averaging a defined number of most recent input signals, wherein the defined number is greater than two.

63.  (original) The apparatus of claim 53, further comprising means for causing the stored signal to be an averaged input signal when two or more signals are obtained in a retry mode.

64.  (currently amended) A machine-readable medium embodying information indicative of instructions for causing one or more machines to perform operations for reading data on a channel or media, the operations comprising:

interpreting an input signal as discrete values;

deciding whether the discrete values have been adequately interpreted from the input signal;

entering a retry mode in response to a decision that the discrete values have not been adequately interpreted from the input signal; and

averaging, in the retry mode, multiple signals to improve interpretation of the input signal including:

obtaining a second signal representing same data as the input signal,

averaging the input signal and the second signal to produce an averaged signal and to improve signal interpretation,

interpreting the averaged signal, and

determining whether the discrete values are adequately indicated based on the averaged signal;

**wherein interpreting the input signal comprises using maximum likelihood detection and error correction to provide the discrete values and a signal quality metric, and the**

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**operations further comprise excluding the input signal from the multiple signals to be averaged based on the signal quality metric.**

65. (original) The machine-readable medium of claim 64, wherein interpreting the input signal comprises:

sampling the input signal;

storing the sampled input signal; and

detecting the discrete values in the sampled input signal.

66. (original) The machine-readable medium of claim 65, wherein sampling the input signal comprises converting the input signal to a digital signal, storing the sampled input signal comprises storing the digital signal, and the multiple signals to be averaged include the stored digital signal.

67. (original) The machine-readable medium of claim 65, wherein sampling the input signal comprises converting the input signal to a digital signal and filtering the digital signal based on finite impulse response, storing the sampled input signal comprises storing the filtered digital signal, and the multiple signals to be averaged include the stored and filtered digital signal.

68. (original) The machine-readable medium of claim 64, wherein the input signal comprises a read signal received from a storage medium, interpreting the input signal comprises determining if the read signal adequately indicates the discrete values, and averaging the multiple

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signals comprises averaging multiple read signals of the storage medium to improve read signal interpretation.

69.     (cancelled)

70.     (cancelled)

71.     (previously presented) The machine-readable medium of claim 64, wherein determining whether the discrete values are adequately indicated comprises interpreting the averaged signal with a Viterbi detector.

72.     (currently amended) **A** ~~The~~ machine-readable medium **embodying information indicative of instructions for causing one or more machines to perform operations for reading data on a channel or media** ~~of claim 64~~, **the operations comprising:**

**interpreting an input signal as discrete values;**

**deciding whether the discrete values have been adequately interpreted from the input signal;**

**entering a retry mode in response to a decision that the discrete values have not been adequately interpreted from the input signal; and**

**averaging, in the retry mode, multiple signals to improve interpretation of the input signal including:**

**obtaining a second signal representing same data as the input signal,**

**averaging the input signal and the second signal to produce an averaged signal and to improve signal interpretation,**

**interpreting the averaged signal, and**

**determining whether the discrete values are adequately indicated based on the**

**averaged signal;**

wherein determining whether the discrete values are adequately indicated comprises

comparing interpretations of the averaged signal and of the second signal.

73.     (currently amended) The machine-readable medium of claim **72** [[64]], wherein

averaging the multiple signals further comprises, in the retry mode, in response to the discrete

values being inadequately indicated, repeatedly obtaining a new signal, averaging most recent

signals, and determining if the newly averaged signal adequately indicates the discrete values.

74.     (original) The machine-readable medium of claim 73, wherein averaging the most

recent signals comprises averaging the three most recent signals.

75.     (previously presented) The machine-readable medium of claim 64, wherein

averaging the multiple signals further comprises, in the retry mode, in response to the discrete

values being inadequately indicated, repeatedly obtaining a new signal, averaging the new signal

with the previous averaged signal, and determining if the newly averaged signal adequately

indicates the discrete values.

76.     (currently amended) The article of claim **52** [[45]], wherein the means for

averaging the multiple signals further comprise means for, in the retry mode, in response to the

discrete values being inadequately indicated, repeatedly obtaining a new signal, averaging most

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recent signals to generate a newly averaged signal, and determining if the newly averaged signal adequately indicates the discrete values.

77. (previously presented) The article of claim 76, wherein the means for averaging the most recent signals comprises means for averaging the three most recent signals.

78. (previously presented) The article of claim 45, wherein the means for averaging the multiple signals further comprise means for, in the retry mode, in response to the discrete values being inadequately indicated, repeatedly obtaining a new signal, averaging the new signal with the previous averaged signal, and determining if the newly averaged signal adequately indicates the discrete values.